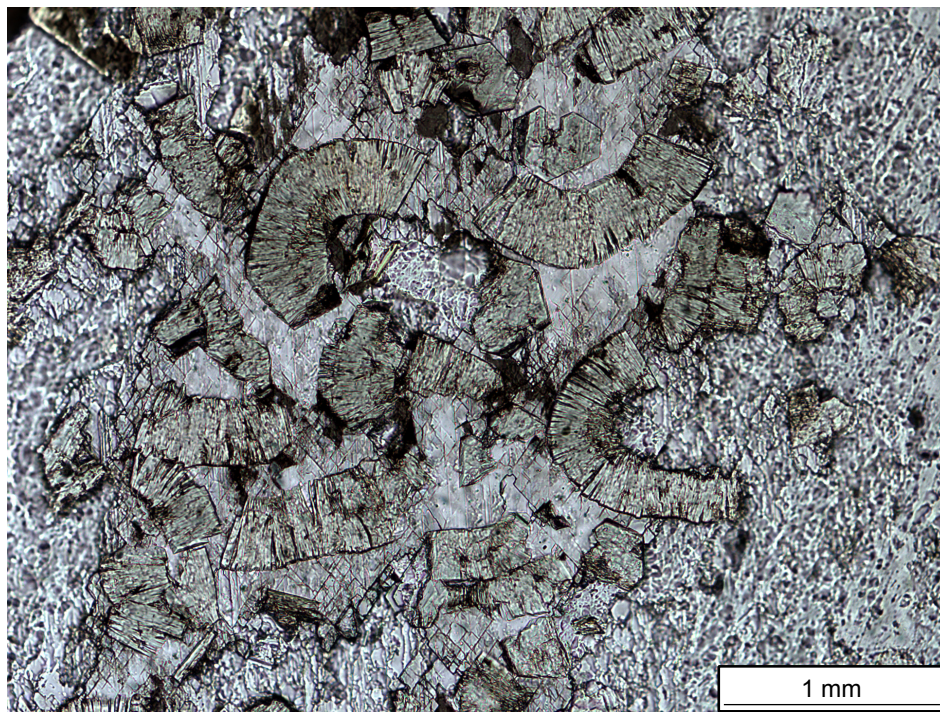
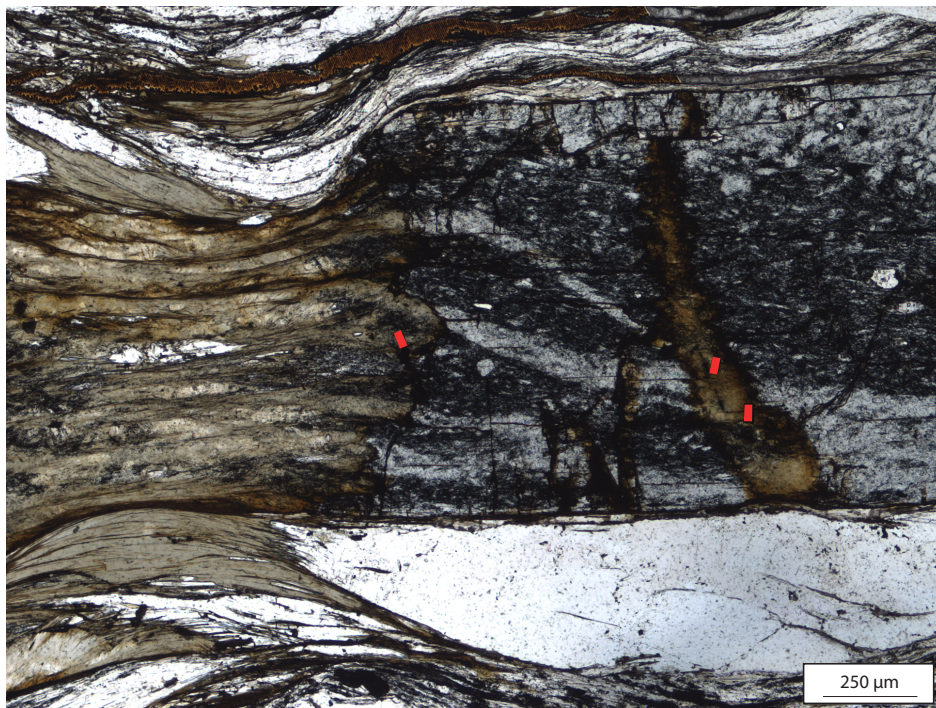


SUPPLEMENTAL FIGURE S1. Variations in XANES spectra with crystal orientation, as measured at ID-31-E (APS), for samples RATO4-3v1 (**a**) and HM09-16B (**b**). Normalized spectra on the exact same spot are shown at 4 orientations varying over 90°. Averages are shown as bold curves. Estimated centroids of pre-edges for all spectra are plotted as vertical lines with height proportional to pre-edge area (right-hand side axis).



SUPPLEMENTAL FIGURE S2. Microphotograph of sample CD76, a rodingite showing chlorite randomly oriented in a carbonate matrix. Note that chlorite is pale green, crystalline and unaltered.



SUPPLEMENTAL FIGURE S3. Microphotograph of sample 4ABSC1, a micaschist showing a group of chlorite oriented along the schistosity with chloritoid, white mica, and quartz, and a second group in veinlets growing at the expense of chloritoid. Note that much of the chlorites have brown edges, possibly due to late oxidation. Red rectangles show EPMA and XANES measuring spots. Brown veinlets at the top of the figure above the chloritoid crystal are cracks filled with epoxy resin, which changed color under the synchrotron beam from translucent to dark to brown.